

Illinois Mathematics
and Science Academy

1998-99

IMSA

annual report



"To live for a time
close to great mind
is the best kind
of education."



OUR VISION

*To create a learning enterprise that liberates
the genius and goodness of all children and
invites and inspires the power and creativity
of the human spirit for the world.*

On the Cover:

IMSA student Anjali Joshi of Schaumburg (right) serves as a student teacher during the 1999 Science Explorers summer program. Elementary school students Kyle Meyer of Bolingbrook (left) and Mike Spoula of North Aurora (center) were among the 120 participants. Photo by Britta McKenna.

dear IMSA SHAREHOLDERS



We are pleased to share with you the 1998–99 annual report of the Illinois Mathematics and Science Academy. IMSA's 13th year was characterized by the development of a comprehensive Business Plan to enable IMSA to achieve its vision of the future. The Business Plan targeted seven areas (Strategic Initiatives) for focused attention, development and growth. These were:

For IMSA students,

- * Student Research and Inquiry
- * Student Leadership Development
- * Learning Standards and Assessment System
- * Great Minds Program

For Illinois teachers and policymakers,

- * Professional Development Programs
- * Products (such as the Internet Toolkit)
- * Public Policy Initiatives
- * Great Minds Program

Embedded in the Strategic Initiatives was *Online Learning* (Learning-at-a-Distance).

The Strategic Initiatives and other important work at IMSA are designed to help us achieve two ambitious goals:

- * By the year 2003, IMSA will be a recognized exemplar and a national leader in mathematics and science teaching and learning.
- * By the year 2006, IMSA will be a recognized pioneer and architect in the design of a new system of learning that is inquiry-based, problem-centered and integrative and that enables learners to acquire, generate and use knowledge for the world.

For far too long, too many educational environments have been *schooling* environments focused on teacher-delivered and student-received information rather than *learning* environments focused on teacher-facilitated and student-generated knowledge. This must change. Young people are capable of extraordinary achievements and significant contributions, and it is the responsibility of educators, parents, taxpayers, policymakers and the business community to provide learning environments that make this possible. With your continuing support, IMSA will work continuously, diligently and resolutely to model and help others become such a learning environment.

We hope you share our pride in the achievements of our students, staff, and educators and students throughout Illinois with whom we work.

Sincerely,

John H. McEachern Jr.
Chairman

Stephanie Pace Marshall, Ph.D.
President

1998-99

YEAR AT A GLANCE

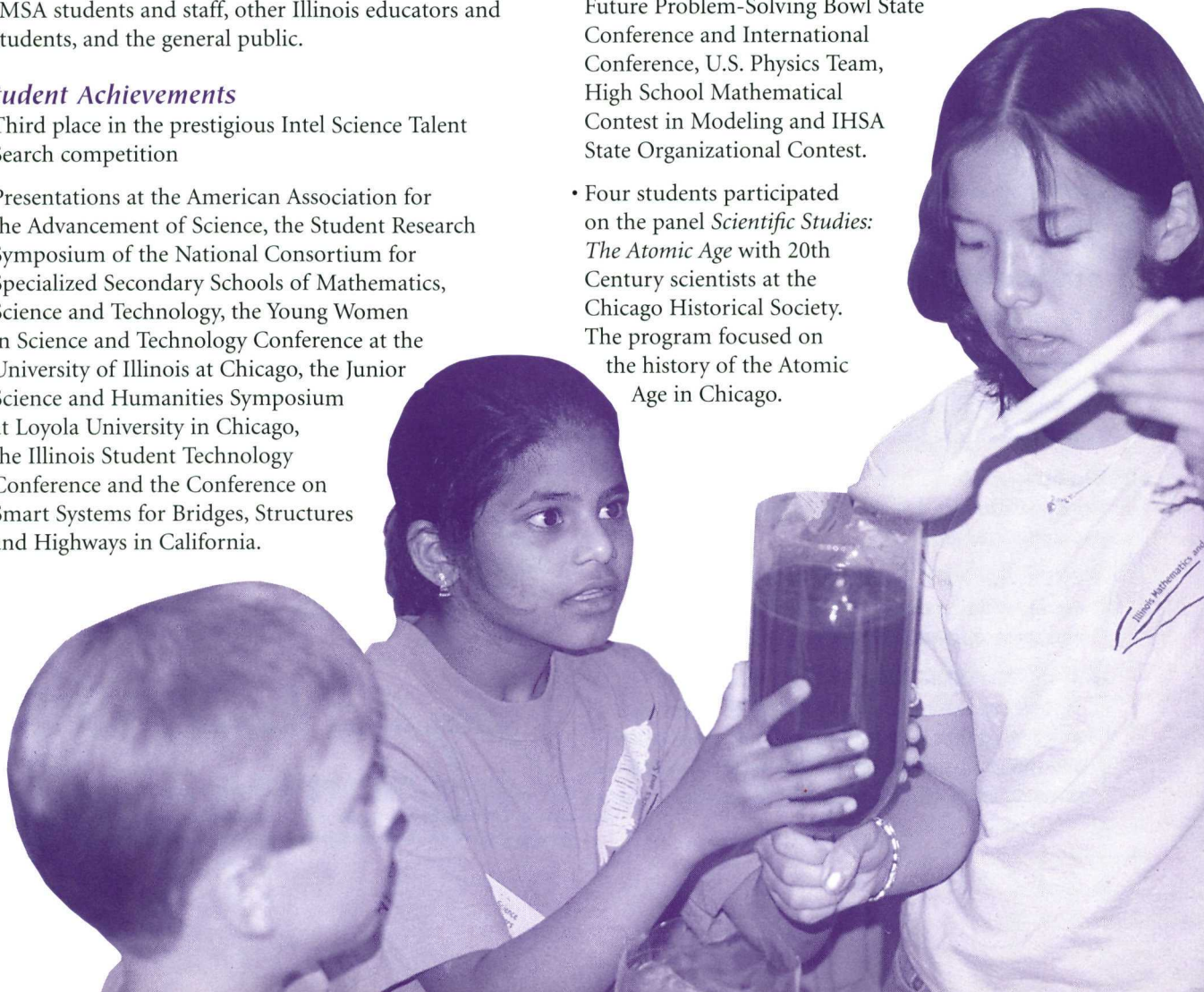
Academic Programs

- Expanded Student Inquiry and Research programs for students to pursue compelling questions of interest, conduct original research, create and invent products and services, participate in professional presentations and publications, and collaborate with other students, mentors, scholars, researchers and inventors throughout the world.
- Developed Academy Learning Standards (content and process, thinking and reasoning) and began work on developing standards for performance/assessment.
- Development work for Scientific Inquiries, a new science program for IMSA students to be implemented in Fall 2000.
- The launching of the IMSA Great Minds Program, led by Nobel Laureate and IMSA Resident Scholar Dr. Leon Lederman. In its inaugural year, the program brought some of the world's foremost authorities to IMSA to share their knowledge with IMSA students and staff, other Illinois educators and students, and the general public.

Student Achievements

- Third place in the prestigious Intel Science Talent Search competition
- Presentations at the American Association for the Advancement of Science, the Student Research Symposium of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology, the Young Women in Science and Technology Conference at the University of Illinois at Chicago, the Junior Science and Humanities Symposium at Loyola University in Chicago, the Illinois Student Technology Conference and the Conference on Smart Systems for Bridges, Structures and Highways in California.

- An IMSA senior was the only student in a group of 11 official United States delegates to attend the first World Conference on Science (WCS) in Budapest, Hungary. In addition, two IMSA juniors were among the 150 students from 50 countries to attend the International Forum of Young Scientists in Budapest, a satellite event of the WCS.
- 2nd highest ACT score in the nation (8800 high schools in the U.S.)
- 44 National Merit semifinalists, seven National Achievement semifinalists, three National Hispanic finalists
- Numerous awards in academic competitions including the national Mandelbrot Competition, Illinois History Exposition, National Knowledge Master Open, North Suburban Math League, American High School Math Exam, National Russian Essay Contest, National German Exam, Illinois Scholastic Bowl, United States Mathematical Olympiad, the Illinois Future Problem-Solving Bowl State Conference and International Conference, U.S. Physics Team, High School Mathematical Contest in Modeling and IHSA State Organizational Contest.
- Four students participated on the panel *Scientific Studies: The Atomic Age* with 20th Century scientists at the Chicago Historical Society. The program focused on the history of the Atomic Age in Chicago.

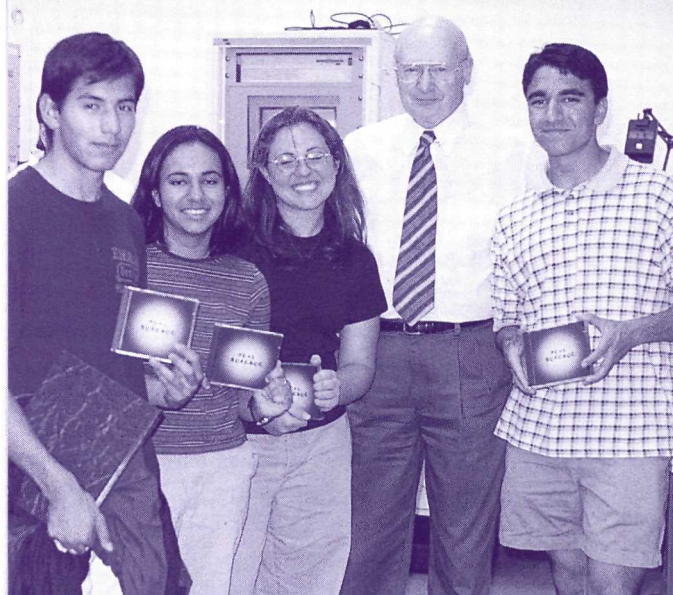


Programs and Services for Illinois Teachers and Students

- Opening of the Tellabs Studio for Professional Development to serve Illinois educators. The Inaugural Seminar Series included professional learning opportunities in problem-based learning, standards-based curriculum alignment and integrating technology into instruction.
- Piloting IMSA's Internet Toolkit with Chicagoland area teachers. This includes interactive learning materials, tips on effective search strategies, software tools such as a meta-search engine, an assessment database and tutorial construction tools designed to build proficiency in using the Internet for research.
- Inaugural Science Explorers On-the-Road and Field Trip experiences for approximately 600 3rd, 4th and 5th grade students taught by IMSA students.
- IMSA students designed and developed the Real Science CD-ROM for 3–5th graders
- Hosting the Great Minds Program Dialogue *Physics First? Redesigning the Science Curriculum for High Schools* attended by more than 100 Chicagoland high school science teachers and administrators. National science education curriculum experts discussed the state of science teaching and learning in the United States, including ideas for redesigning the science curriculum.

Special Events

- Dedication of the Tellabs Studio for Professional Development.
 - Inaugural IMSA Alumni Association REN Weekend. Alumni, faculty, staff, students, parents, board members and others came together to discuss a variety of topics and important current issues.
 - Ameritech's 1998 Senate Education Technology Demonstration. IMSA was selected as one of 10 Midwest schools to be linked with Capitol Hill for the event, which was orchestrated and broadcast from IMSA's Toyota Video Production Laboratory.



IMSA Real Science editors (left to right) Jorge Reyes, Neha Narula, Janessa Stream and Hari Phatak stand with Mr. John Benson, president of Beta Graphics Corporation. Beta Graphics, located in Aurora, donated the production of 600 Real Science CD-ROMs. Photo by Britta McKenna.

- Seventh annual Richard L. Horwitz Lecture on Ethics featuring noted author and businessman Stedman Graham.
- Commencement of the 187-member Class of 1999, featuring Commencement speaker Dr. Shirley Mahaley Malcom, head, Directorate for Education and Human Resources Programs at the American Association for the Advancement of Science, and student speakers Mathew Baumgart of DeKalb and Elissa Larkin of Mundelein.

Leadership Investments

- \$13.9 million in operating funds by the State of Illinois to support IMSA's residential/academic program and statewide service programs
- \$1.3 million in gifts by corporations, foundations, individuals, and competitive government grants and contracts, to the IMSA Fund for Advancement of Education to support various initiatives
- \$150,000 from The Hansen-Furnas Foundation to support the Hansen-Furnas Foundation Resident Scholar Fund of the IMSA Great Minds Program. The gift will help connect high school students from throughout Illinois, as well as mathematics and science teachers, to the best minds in the world.
- \$58,000 from the Lloyd A. Fry Foundation for support of the Summer Enrichment for Academics in Mathematics and Science (S.E.A.M.S.) minority recruitment program.
- \$30,000 from the Motorola Foundation for sponsorship of the March 2000 Professional Conference of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology.

student

LEARNING AT IMSA

In 1998-99 IMSA focused on several important issues—what and how students learn,

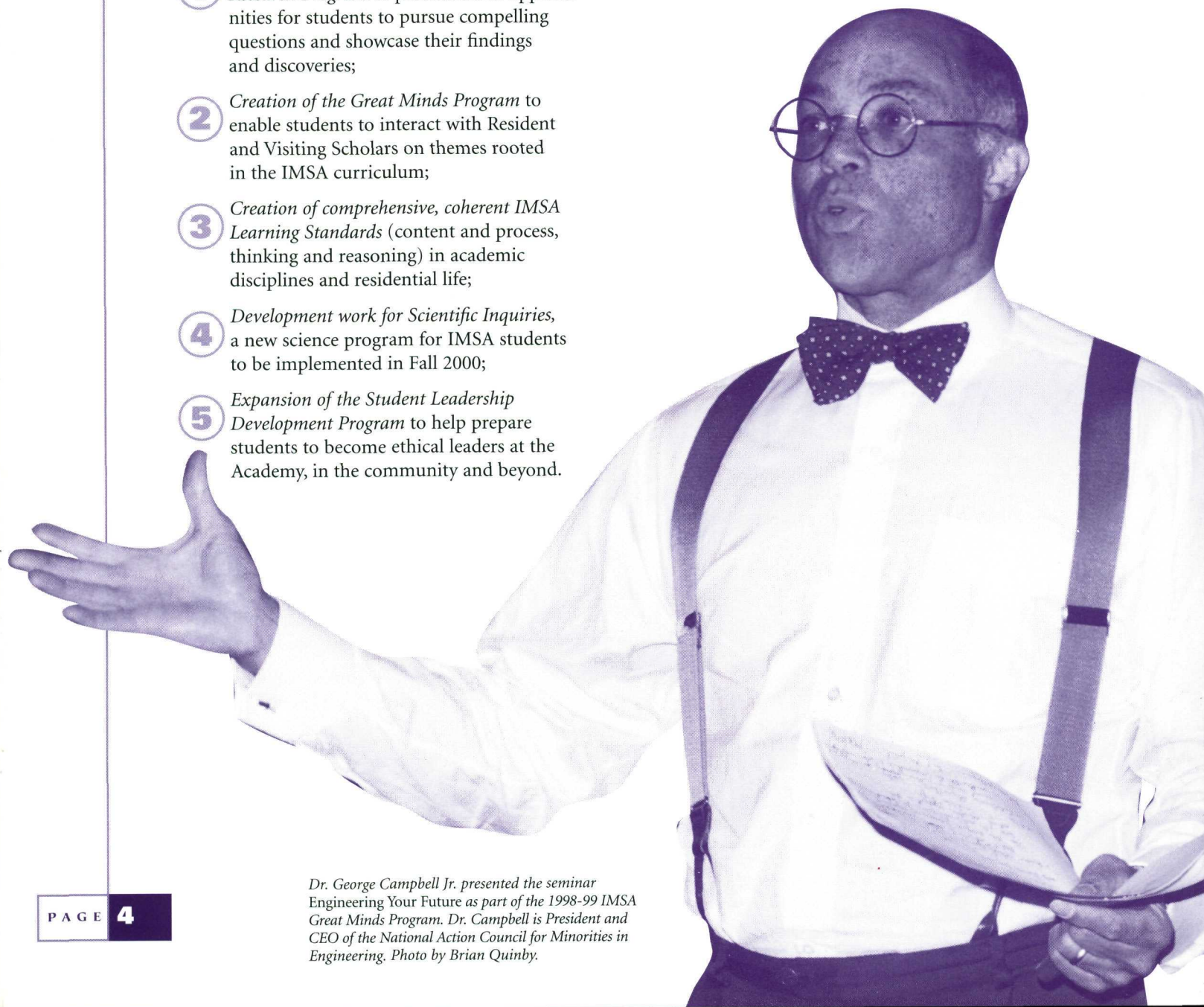
how their learning is assessed, and how they develop as highly skilled inquirers, researchers and leaders.

Strategic initiatives included: Student Inquiry and Research, Standards and Assessment, Student

Leadership Development and the Great Minds Program.

Academic program enhancements included:

- ① *Expansion of the Student Inquiry and Research Program* to provide more opportunities for students to pursue compelling questions and showcase their findings and discoveries;
- ② *Creation of the Great Minds Program* to enable students to interact with Resident and Visiting Scholars on themes rooted in the IMSA curriculum;
- ③ *Creation of comprehensive, coherent IMSA Learning Standards* (content and process, thinking and reasoning) in academic disciplines and residential life;
- ④ *Development work for Scientific Inquiries*, a new science program for IMSA students to be implemented in Fall 2000;
- ⑤ *Expansion of the Student Leadership Development Program* to help prepare students to become ethical leaders at the Academy, in the community and beyond.



Dr. George Campbell Jr. presented the seminar Engineering Your Future as part of the 1998-99 IMSA Great Minds Program. Dr. Campbell is President and CEO of the National Action Council for Minorities in Engineering. Photo by Brian Quinby.

Academic Program Enhancement #1: Expansion of the IMSA Student Inquiry and Research Program

The Student Inquiry and Research Program enables students to pursue compelling questions of interest, conduct original research in science and other fields, create and invent products and services, share their work through presentations and publications, and collaborate with other students, mentors, scholars, researchers and inventors throughout the world.

Students engage in scholarly and scientific investigation, as well as creative and artistic expression. Learning experiences foster the development of students as highly skilled and integrative problem finders, problem solvers, and apprentice investigators, all skills required to succeed in the global workplace of the 21st Century.

In 1998–99, expanded Student Inquiry and Research opportunities included:

Mentorship

Mentorship is an interactive research partnership which pairs students with master scholars and scientists in laboratories, museums, corporations and universities, based on student interest and talent in a particular field of study.

Begun in 1989 with just 28 students, Mentorship now involves about 150 students each year. Since 1989, scientists and researchers from more than 100 institutions have mentored IMSA students, helping them become contributing members of the scientific and scholarship community.

IMSA students have made significant contributions to research fields through publication in professional journals, presentation at professional research conferences, creation of novel programs and discovery of innovative techniques.

Research fields have included: *superconductivity, biochemistry, astrophysics, law, material science, nanotechnology, domestic violence, anthropology, economics, biomedical ethics, mathematics, pediatric oncology, computer graphics, genetics, art restoration, paleontology, environmental engineering, archaeology, neuropsychiatry, fluid dynamics, and immunology.*

Mentorship achievements included:

- ✧ Adrianna Zhang authored *The detection of simian virus in human tumours by polymerase chain reaction*, published in 1998 in the Italian professional journal, *Monaldi Arch Chest Disease*.
- ✧ Clara Shih co-presented *Development of a PVDF Film Sensor for Infrastructure Monitoring* at the professional Conference on Smart Systems for Bridges, Structures and Highways.
- ✧ Ten students presented at the 1999 American Association for the Advancement of Science (AAAS) Annual Meeting and Science Innovation Exposition. Their research topics included: *Immunology, Virology, Neurobiology, Developmental Biology, Bacteriology, Reproductive Biology and Mechanical Engineering*.
- ✧ Sunita Jasti and Anuoluwa Adeboje presented *Serotonin and Immunocytochemistry* at the Sixth Annual Student Research Symposium of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology.
- ✧ Jason Chung presented *Cloning and Characterization of a Novel NLS Receptor, Importin Alpha 4, from Caenorhabditis elegans* at the Junior Science and Humanities Symposium.
- ✧ Jennifer Leung received the 1999 Elizabeth Glaser Pediatric AIDS Foundation Student Intern Award for her research, conducted at the Children's Memorial Hospital in the Department of Pediatrics, Microbiology-Immunology.

"I look back at the level of chemistry I had when I was working for you, and I respect you so much for tolerating us smug, yet green high school students. My lab skills and confidence have increased dramatically ... and I have a much greater appreciation for science ..."

IMSA Alumnus Brad Jellerichs ('97)
Student, University of Illinois
Urbana-Champaign
Major: Specialized Chemistry
(excerpt from a letter written to Brad's former mentor)

"Your (IMSA) student teachers were excellent and well prepared with plans and materials ... I feel that children always like to have other children teach them and are eager to listen to them."

Sue Strayer
Teacher
Schiesher Elementary School,
Lisle, Ill.
Site for IMSA Science
Explorers On-the-Road

Student Plans of Inquiry

Initiated in 1997–98, self-generated Student Plans of Inquiry are a set of learning experiences which are created, designed, developed and

demonstrated by an individual student's or a group of students' questions. Students pose and answer a specific question or problem; the knowledge generated as a result may be new to the world or, more likely, knowledge that is new to the student.

Examples of Student Plans of Inquiry can include Senior Research Projects, projects completed as part of a co-curricular activity (such as the Chicago Metro History Fair) and projects completed as part of the IMSA Great Minds Program (see page 7).

Inquiry project highlights included:

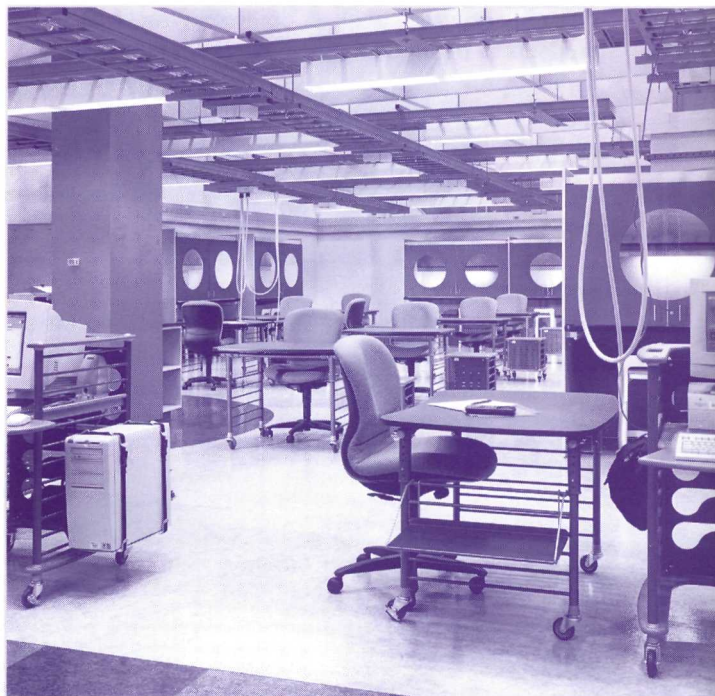
- ✧ Students designed, developed and taught the science curriculum for *The IMSA Science Explorers Program*. The 1998–99 program included summer day camps for children entering 4th, 5th and 6th grades, an on-the-road program to selected elementary schools, and field trip experiences to the IMSA campus.
- ✧ Rachel MacKenzie composed and performed several original pieces of music as a result of her Inquiry project, *Musical Composition for Piano*. Various musical techniques were explored, inspired by the study of works of composers such as J.S. Bach, Debussy, Beethoven and others.
- ✧ The Inquiry project, *Resurgence of Diseases in Relation to Civil Discord in Africa*, documented how the refugee movements, overcrowding in cities and alteration of the topography have created a public health threat in Africa (cholera, ebola, AIDS, malaria).
- ✧ The multi-year Inquiry project, *Evolution of the Hannaford Woods Great Blue Heron Rookery*, studied the impact of a new housing development directly to the east of the rookery on nesting patterns (drastic decline). The project will continue to determine whether the herons will return or migrate somewhere else.

Classroom Work

Coursework at IMSA regularly incorporates opportunities for students to develop as inquirers and researchers.

Collaborative projects are assigned based on the class theme. Students research a topic and formulate and reformulate inquiry questions that lead them to new knowledge. They then share and discuss this knowledge with classmates.

In laboratory work, students engage in opportunities for developing experimental protocols and changing variables relevant to the investigation.



The Grainger Center for Imagination and Inquiry opened in Fall 1999. This new research space for students on the IMSA campus won a Merit Award from the American Institute of Architects Committee on Architecture for Education (AIA/CAE) in the 1999 Design Awards & Exemplary Learning Environment Program. Only 24 design projects in the nation received recognition from the AIA. The Grainger Center was designed by O'Donnell Wicklund Pigozzi and Peterson Architects Incorporated of Chicago. Photo by Scott McDonald of Hedrich Blessing.

"Once you are in the position of a teacher you see teachers from a whole new perspective ... I now have so much more respect and appreciation for all their hard work."

Jorge Reyes
IMSA Science Explorers student teacher

Highlights of classroom projects/achievements included:

- * In *Ecology*, students investigated the nature of the vocalizations of wolves and coyotes. This led to several questions and an analysis based on computer techniques of pre-recorded sounds. Students then worked with real coyotes in a field setting.
- * In *Plants and People* during the study of fermentation, a student wanted to know more about the tea production of her family's home country. She explored the relationship (historic and current) between the Thomas Lipton Company and Sri Lanka.
- * Students in *American Studies* worked on a problem-centered unit called "On the Night of April 14th," the day President Abraham Lincoln was shot in 1865. Students were presented with 15 telegrams which were sent from Washington to a New York newspaper during that night. The reports were "all over the map": some said Lincoln was dead while others said he was alive. Students investigated each report to decide which accounts were historical and/or accurate.

For abstracts of 1998-99 Student Inquiry and Research projects, contact the Office of Institutional Advancement at (630) 907-5033.

Academic Program Enhancement #2: Creation of the Great Minds Program

To "bring the best minds in the world to IMSA," the Illinois Mathematics and Science Academy launched its Great Minds Program in the Fall of 1998. The program, under the leadership of Nobel Laureate and Resident Scholar Dr. Leon Lederman, broadens and deepens the IMSA learning experience through interactions with Resident and Visiting Scholars who address themes rooted in the IMSA curriculum.

In the first year alone, students interacted with some of the world's foremost authorities in the fields of cosmology, particle physics, immunology, holography, oncology and chemistry.

The three primary components included the Great Minds Dialogues for Illinois educators and students; Great Minds Seminars for IMSA students, staff and invited guests and Great Minds Community Lectures for the general public.

In 1998-99, students enjoyed:

Great Minds Program Seminars

What Is Theoretical Physics?

Dr. Chris Quigg, Senior Physicist
Fermi National Accelerator Laboratory

The Impossible Takes a Little Longer

Dr. Dudley Herschbach, Nobel Laureate in Chemistry
Harvard University

The Golden Age of Cosmology

Dr. Michael Turner, Chairman
Dept. of Astronomy, University of Chicago

Dr. Lawrence Krauss, Dept. of Physics
CASE Western University,
Author: *The Physics of Star Trek*

Dr. Wendy Freedman, Director
Hubble Space Telescope Program

Chromosomes and Leukemia

Dr. Janet D. Rowley, Molecular Biologist
University of Chicago
1998 National Medal of Science Winner

Physics for the Young: Just So & Other Stories

Dr. Janet Conrad, Assistant Professor,
Columbia University
Presidential Early Career Award for Scientists and Engineers, 1999

Engineering Your Future

Dr. George Campbell, Jr., President & CEO
National Action Council for Minorities
in Engineering

Great Minds Program Community Lectures

The God Particle

Dr. Leon Lederman

Why is the Universe Accelerating?

Dr. Michael Turner

In addition, visiting scholars Dr. Jack Steinberger, Nobel Laureate in Physics, and Dr. Jan Visser of UNESCO held informal small-group discussions with students.

Great Minds Science Biographies Project

Students worked with IMSA Resident Scholar and Nobel Laureate Dr. Leon Lederman in a multi-year Inquiry project, *Great Minds Science Biography Project: Milestones in 20th Century Science*. This documents important breakthroughs in 20th Century science and will culminate in a book for middle school students written by IMSA students and Dr. Lederman, profiling 12–15 key scientists who significantly influenced life on the planet.

Academic Program Enhancement #3: Creation of Comprehensive, Coherent IMSA Learning Standards

In 1998–99, IMSA developed its Learning Standards which articulate expectations in academic disciplines and residential life. Common components include:

- Program Purpose Statements
- Team Goals
- Unifying Concepts and Processes
- Learning Standards (content and process)
- Standards of Significant Learning

The Learning Standards will enable IMSA to communicate and deliver more effectively learning experiences which are integrative, inquiry-based, problem-centered and competency-driven.

In addition, the Standards reflect student learning expectations beyond the Illinois State Standards and serve as a resource for other teachers and programs.

For more information, visit the IMSA Learning Standards website at:
www.imsa.edu/team/tls/standards

Academic Program Enhancement #4: Development Work for Scientific Inquiries

In 1998–99, IMSA continued development work for Scientific Inquiries, a new science program for IMSA students to be implemented in Fall 2000. Work was completed on the IMSA Science Learning Standards, a concept paper and the program framework.

Scientific Inquiries will incorporate the best practices of the former “pathways” for students (Integrated Science, Sophomore Physics and Sophomore Chemistry core, and Perspectives). In addition, its development will be informed by what IMSA has learned from science education literature, dialog with partner science teachers from other schools, and leading experts in science and science education.

Science Learning Standards

IMSA’s Science Learning Standards were developed over two years after careful consideration of the National Research Council’s *National Science Education Standards*, Project 2061’s *Benchmarks for Science Literacy*, the *Illinois Science Learning Standards* and standards used in courses and programs at IMSA.

IMSA’s Science Learning Standards articulate that students studying science at IMSA will:

- engage in the process of scientific inquiry.
- apply the process of technological design.
- demonstrate understanding of the structure and interactions of matter.
- demonstrate understanding of energy in its various forms and its transformations.
- demonstrate understanding of force and motion.
- demonstrate understanding of Earth features and processes.
- demonstrate understanding of the nature of the universe.
- demonstrate understanding of the cellular nature of organisms.
- demonstrate understanding of the interdependence of organisms.
- demonstrate understanding of evolution and its genetic basis.
- employ historical, personal, and social perspectives with respect to the nature of science and technology.

Scientific Inquiries Program Framework

The proposed program framework provides a way for students to address the IMSA Science Learning Standards over the span of a proposed two-year program. The framework identifies important topics and arranges these in a meaningful progression to help students answer the question "How do I come to know the natural world?"

Continuous strands include historical and societal contexts of science as well as scientific inquiry. In addition, the students' growing understanding of science will be supported by a parallel mathematics-appropriate learning sequence.

For each Scientific Inquiry program module, a set of "Essential Questions and Enduring Understandings" are being defined.

Examples include:

- How do you explain the states of matter and their changes?
- What is the structure of basic biological matter?
- How do you characterize motion and its causes?
- What are the nuclear processes involved in energy production?
- What is the role of chemical energy in living systems?
- What are the interdependencies of life and natural systems?

Faculty will finalize the development of the initial Scientific Inquiry program in 1999–2000, focusing on assessments and evidence of understanding.

Academic Program Enhancement #5: Expansion of the Student Leadership Development Program

Another goal of IMSA's program is to develop ethical leaders. The Student Leadership Development Program engages students in the challenge of leading others and creating a sense of belonging to a community.

In 1998–99, significant steps were taken to make ethical leadership an explicit part of learning in classroom and residential life activities. A highlight was the strengthening of the Residential Life Curriculum.

Residential Life Curriculum

This standards-based curriculum helps students become responsible community members and ethical leaders who understand themselves, the world and their place in the world. The major goals include:

- Create safe, healthy and nurturing living and learning communities designed to enhance student growth;
- Provide learning experiences that promote the development of life skills, personal accountability, and personal identity;

(continued next page)



IMSA student Jonathan Berger of Wayne entertains guests at the opening of the Tellabs Studio for Professional Development on the IMSA campus. Photo by Rich Malec Photography

- Provide students with opportunities to build healthy relationships with peers and adults in a climate of mutual respect and trust;
- Provide learning opportunities which will enable students to demonstrate ethical leadership and contributions to the community.

Sophomore Navigation is an important part of the residential life curriculum and was expanded in 1998-99 to address a more diverse spectrum. Topics included relationships, time management, multicultural awareness, ethical decision-making, drug and alcohol issues, wellness, and transitions.

In addition to sophomore navigation, summer navigation is held for students and their parents to help them make a smooth transition to Academy life. During that time, parents and students have the opportunity to spend time on the IMSA campus, experiencing life in the classroom, the residence halls and the cafeteria, in addition to meeting IMSA staff members. Topics covered include the residential life curriculum, residential life policies, community service and work service programs, student health, student safety, student discipline and athletics and co-curricular activities.

Other Academic Program Highlights: Longitudinal Study of IMSA Graduates

To determine the impact of the overall IMSA experience on students' development, obtain valuable recommendations for program improvement, and track how graduates contribute to the betterment of Illinois, the nation and world, the Academy conducts the Longitudinal Study of IMSA Graduates.

In 1998-99, IMSA presented its first comprehensive findings of the Longitudinal Study of IMSA Graduates for the Classes of 1989-1994. To provide context for the findings, the classes were grouped into three year generations (1989-1991 and 1992-1994). This grouping allowed IMSA to identify specific trends and place the classes in the proper context of the Academy's evolving program. Surveys are conducted during an IMSA graduates' freshman and senior year in college and in 1998, the research study was redesigned to include a post-college survey, seven years after a class had graduated from IMSA.

Some of the results of the Classes of 1989-1994 surveys included the following:

- ✧ Nearly 100% of graduates said that IMSA had academically prepared them and improved their critical thinking skills
- ✧ 64.2% to 76.7% said that IMSA had improved their ability to consider ethical implications in their decision-making
- ✧ 45% of IMSA graduates had majored in science in college (compared with 20% nationally)
- ✧ An average of 16% of IMSA graduates had majored in math or computer science (compared with 5% nationally)



Student Testing Highlights

- ✧ Mean SAT I composite score for IMSA seniors was 1391, 375 points above the national average for college-bound seniors.
- ✧ Mean ACT composite score for IMSA seniors was 30.6, 9.6 points above the national average for college-bound seniors.
- ✧ Of IMSA juniors and seniors taking the Advanced Placement Examinations, 87% scored "3" or better and 61% scored "4" or better.
- ✧ Mean SAT II score for IMSA seniors taking the Mathematics-Level IIC Test was 740, 84 points above the national average for college-bound seniors. Mean IMSA score for the English Writing SAT II Test was 680, 87 points above the national average for college-bound seniors.

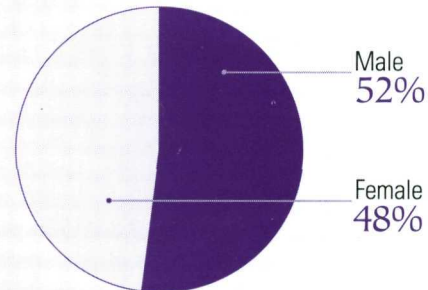
For more detailed information regarding student testing, you can request a copy of the IMSA Profile by contacting the College and Academic Counseling Office at (630) 907-5056.



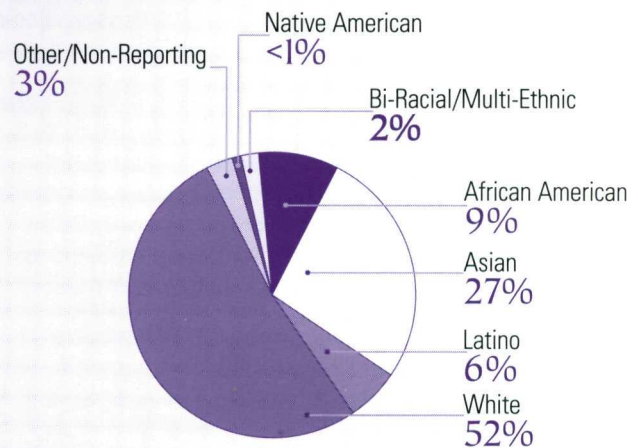
IMSA Ecology students Ryan Armour, Carrie Giordano, Anne Feltovich and Noah Valentino use radio telemetry equipment to track coyotes in Yellowstone National Park. Photo by John Thompson.

1998-99 Student Profile

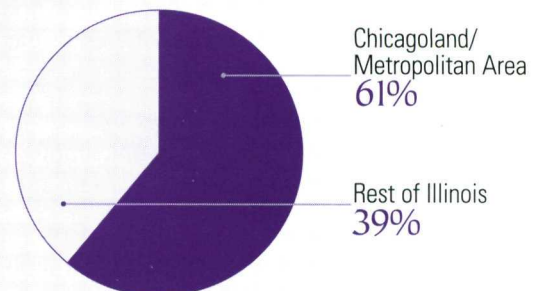
GENDER



ETHNICITY



GEOGRAPHY



service to

ILLINOIS & BEYOND

The Center for Problem-Based Learning and the Center for Collaborative Inquiry in Mathematics and

Science merged in 1998–99 to form a new entity, **The Center for the Advancement and**

Renewal of Learning and Teaching in Mathematics, Science and Technology

(The Center@IMSA).

The Center@IMSA (www.imsa.edu/center) brings increased focus and coherence to IMSA's professional development work in the areas of continuing professional learning/growth in mathematics and science, and teacher recruitment and preparation. The addition of the Tellabs Studio for Professional Development in 1998–99 serves as the area on the IMSA campus dedicated to the professional development of educators.

In addition to IMSA's professional development work, Academy staff also work closely with policy makers to shape Illinois' agenda for mathematics and science learning and teaching and to strengthen programmatic coherence, integration and leverage statewide. IMSA also sponsors programs for other Illinois students to encourage their interest in mathematics and science.

The external work of The Center@IMSA focuses on three markets for professional learning with delivery formats uniquely designed to each market. These include:

- 1** *Knowledge and Skills for 21st Century Educators for individual middle and secondary school educators of mathematics and science which includes professional development programs and services offered through open enrollment and contractual arrangements;*
- 2** *Transformational Schools for teams of educators which includes systemic improvement initiatives to transform learning and teaching in mathematics and science;*
- 3** *Teachers for the 21st Century for future leaders which includes teacher recruitment and preparation programs.*



Visiting high school students participate in a hands-on DNA workshop following the Great Minds Program entitled Science and Society: Real World Issues for Students and Teachers. Photo by Brian Quinby.

Program content for professional development experiences offered through the Center is focused in the following areas:

- ✧ *Mathematics and Science Content and Pedagogy* which includes key areas of need as derived from national and Illinois Learning Standards (such as data analysis and Calculus Reform in mathematics; concepts and principles of earth and space science; scientific inquiry and applications of technology);
- ✧ *Strategies for Learning* which includes Problem-Based Learning (PBL) as a curriculum and pedagogical model and Internet-Based Learning;
- ✧ *Standards-Based Education* which includes understanding and leveraging components of education systems (such as curriculum, professional development and resource allocation), research findings, and tools of education reform (such as standards, assessments, and quality assurance models) to maximize student learning as defined by local, state and national standards;
- ✧ *Teacher Recruitment* which includes attracting talented mathematics and science high school students into teaching by engaging them in planning and conducting summer enrichment experiences for younger students.



Professional Learning Programs and Services: Knowledge and Skills for 21st Century Educators

IMSA's professional development programs and services in this category are offered through open enrollment and contractual arrangements and are *targeted to middle and secondary school educators of mathematics and science.*

Examples of these types of programs include institutes, workshops, conferences, Great Minds Program Dialogues, on-line resources, products and professional development networks. In 1998-99, IMSA served 981 educators, 518 institutions and 650 students through these professional development programs and services. In addition, IMSA distributed more than 16,000 products to educators including books, videos and CD-ROMs, and had more than 780,000 visitors to various service program websites.

Highlights of professional development programs, services and products in 1998-99 for middle and secondary school educators of mathematics and science included:

- ✧ *Great Minds Program Dialogues*—included “Stories of a Scientist”; “Science and Society: Real World Issues for Students and Teachers”; and “Physics First? Redesigning the Science Curriculum for High School.”
- ✧ *Illinois Problem-Based Learning Network Summer Institutes*—beginning teachers implemented a problem-based learning experience with students at IMSA and several other sites throughout Illinois.
- ✧ *Harris Institute for Introduction to Problem-Based Learning*
- ✧ *IMSA Internet Toolkit*—developed by IMSA in partnership with Illinois teachers, librarians and students, the Toolkit helps educators and students to more effectively locate, evaluate and use electronic information on the Internet through the use of interactive learning materials, a meta-search engine, an assessment database and tutorial construction tools.
- ✧ *Center@IMSA* (www.imsa.edu/center/) website—offered numerous professional development resources and online learning experiences for mathematics and science educators.
- ✧ *Professional development workshops*—included topics in standards-based curriculum alignment, problem-based learning, and integrating technology into classroom practice.

- * *Professional development networks*—included IMPACT II, Illinois Problem-Based Learning Network, and PBL Net, maintained in collaboration with the Association for Supervision and Curriculum Development.
- * *Internet Toolkit partnerships*—trained “lead teachers” from schools in Elgin District U-46, Walter L. Newberry Mathematics and Science Magnet School in Chicago, West Aurora High School, East Aurora High School and Wredling Middle School in St. Charles in the use of the Toolkit so that they could then train 10 other teachers in their schools or districts.

Professional Learning Programs and Services: Transformational Schools

IMSA’s professional development programs and services in this category include systemic improvement initiatives *targeted to teams of educators* to transform learning and teaching in mathematics and science.

Examples of these types of programs include long term district and school-based contracts for professional development, school improvement initiatives, program evaluation and consultative services. In 1998–99, IMSA served 258 educators and 81 institutions through these systemic improvement initiatives.

Highlights of professional development programs, services and products in 1998-99 for teams of educators included:

- * *Curriculum alignment partnerships*—worked with Plainfield (K-12) and Newark (9-12) school districts to help them align their science curriculum to national and Illinois Learning Standards.
- * *Shepherd High School (Palos Heights, IL) research partnership*—measured the impact of its interdisciplinary program on its students (freshman-junior year). Research focused on academic performance, attitude and other behavioral measures.
- * *Hinsdale South High School program evaluation*—consulted with science faculty and evaluated its science program.

Illinois middle and secondary school educators of mathematics and science attended the Great Minds Program dialogue at IMSA entitled Physics First? Redesigning the Science Curriculum for High School.
Photo by Brian Quinby



Professional Learning Programs and Services: Teachers for the 21st Century

IMSA's professional development programs and services in this category *targeted to future leaders* include teacher recruitment and preparation in the fields of mathematics and science.

Examples of these types of programs include the IMSA Science Explorers Program for attracting talented high school students into science teaching careers and the *Real Science* CD-ROM. In 1998-99, IMSA served 29 educators, 40 institutions and 641 students through these teacher recruitment and preparation initiatives.

Highlights of professional development programs, services and products in 1998-99 for future leaders included:

- * *Science Explorers summer camp*—included two one-week hands-on science summer day camp experiences for 120 students entering grades 4–6, developed and taught by IMSA students and guided by IMSA faculty, staff and corporate partners.
- * *Science Explorers Field Trips*—3rd–5th graders from five area elementary schools visited IMSA for a half-day of hands-on science experiences taught by IMSA students.
- * *Science Explorers On-The-Road*—IMSA student teachers visited five area elementary schools (10 classrooms) and led 3rd–5th graders in hands-on activities.
- * *Real Science CD-ROM*—developed by IMSA students for students in grades 3–5, this interactive CD-ROM was distributed to more than 350 Chicago area elementary schools for use by upper elementary school teachers in their science curriculum.



Sgt. Rusty Sullivan, Aurora Police Department Evidence Technician, shows IMSA's "science explorers" what detectives in the real world use to mark evidence at the scene of a crime. Photo by Britta McKenna.

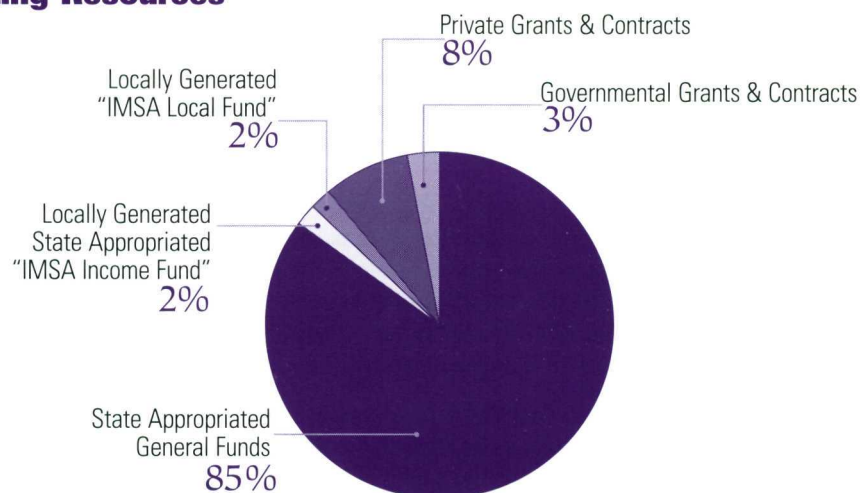
Other Professional Learning Programs and Services: Public Policy Leadership and Programs for Illinois Students

Public Policy Leadership—IMSA works closely with policy makers to shape Illinois' agenda for mathematics and science learning and teaching and to strengthen programmatic coherence, integration and leverage statewide. Examples include IMSA's role in the Illinois Science and Technology Advisory Council, leadership of the Illinois Learning Standards Project, and initiatives and recommendations for teaching standards, teacher preparation, certification and professional development, and the role and use of technology to support teaching and learning needs.

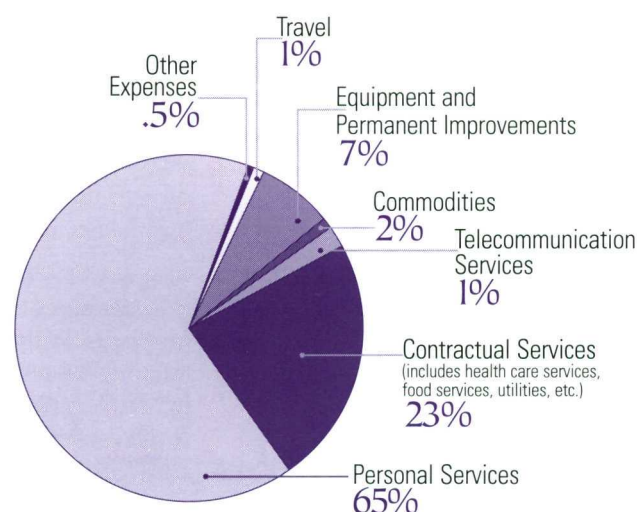
Programs for Illinois Students—IMSA also sponsors programs for other Illinois students to encourage their interest in mathematics and science. Examples include Summer Sleuths, Summer Enrichment for Academics in Mathematics and Science (SEAMS), Early Involvement Program (EIP) and Project School Visit.

Sources of Operating Resources

Total Operating Resources
\$16,569,900



Expenditures



To support and expand the Academy's research, innovative teaching and external service programs/initiatives, the Illinois General Assembly appropriated an operating budget of \$13.9 million in 1998-99. The IMSA Fund for Advancement of Education works to secure the support and participation of various constituencies including individuals, corporations, foundations, educational institutions and governmental agencies to advance the Academy's mission. During 1998-99, the IMSA Fund raised \$1.3 million in external support.

To receive a copy of the 1998-99 IMSA Fund Annual Report, contact the Office of Institutional Advancement and Public Policy at (630) 907-5040.

The most significant capital projects included replacement of the roof top air handling units (including the temperature control system) and the completion of the Grainger Center for Imagination and Inquiry. The new Center has already won two architectural awards for design. Also, the interior lighting fixtures in the academic areas were replaced.

IMSA parents paid a \$940 fee in 1998-99 to offset some of the costs of cocurricular programs and residential services.

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OUR MISSION

The mission of the Illinois Mathematics and Science Academy, a pioneering educational community, is to transform mathematics and science teaching and learning by developing ethical leaders who know the joy of discovering and forging connections within and among mathematics, science, the arts, and the humanities by means of an exemplary laboratory environment characterized by research, innovative teaching, and service.

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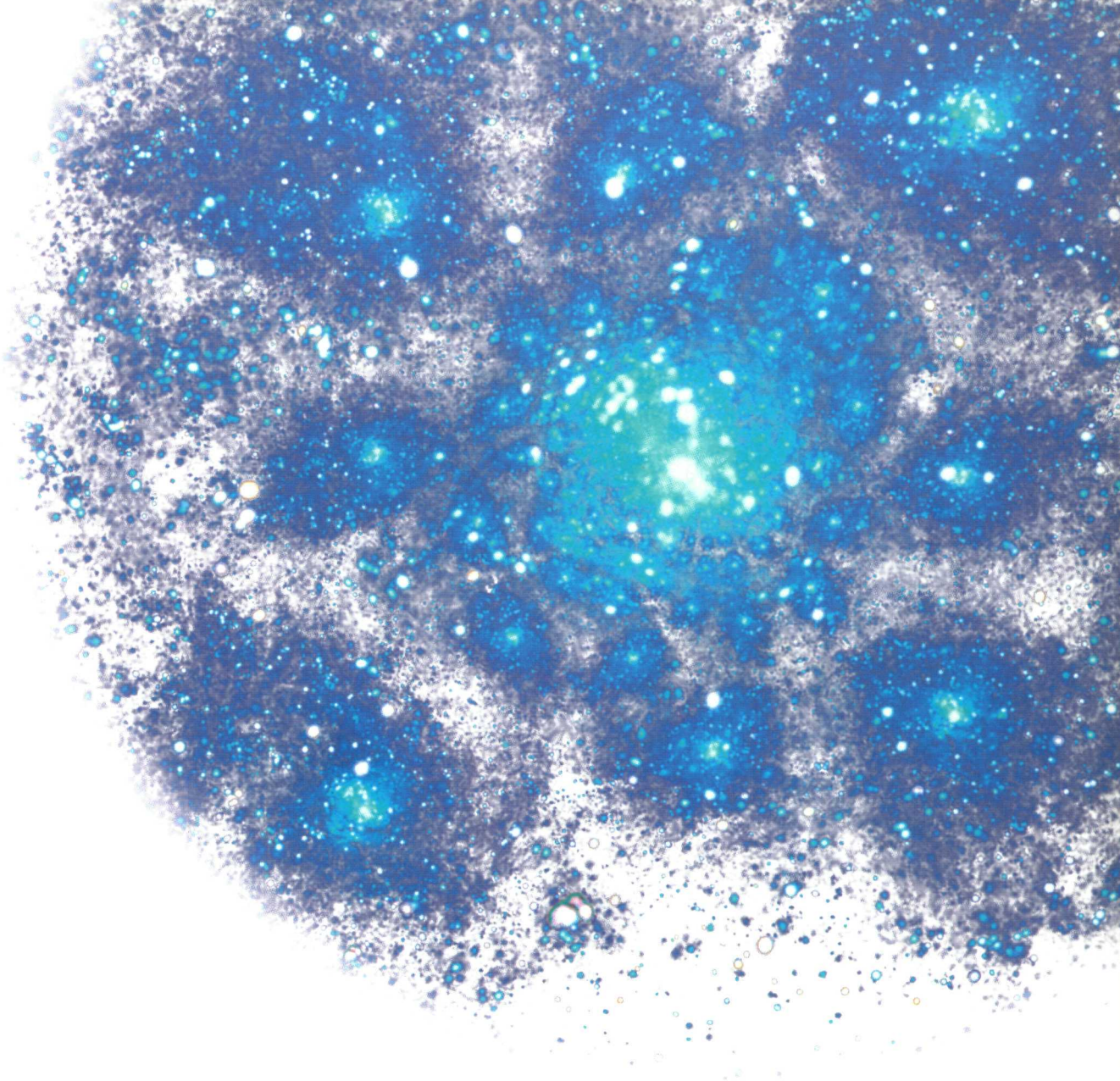
*As taken from Scientific Quotations:
The Harvest of a Quiet Eye*

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Cover concept:

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